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ABSTRACT

The advent of the technological revolution will affect both the world of work and the educative process. Predictions for high technology employment show high levels of growth in the 1980s, and most of these jobs will require specialized training. Dealing with the problem of job training, two possibilities emerge: the Job Training Partnership Act and the Electronic University. The Job Training Partnership Act will focus on assisting people to obtain skills needed for employment, while the Electronic University will offer courses to reach all learners on all levels, including workers who need retraining. In addition, with the renewed interest in improving education, the National Commission on Excellence in Education is recommending the strengthening of graduation requirements in the basics as well as the inclusion of computer science courses. The Office of Educational Research and Improvement (OERI) has taken the initiative in implementing technology in education, and several programs are in place which utilize technology to improve the teaching of writing in grades 3 through 6, and educational television to teach science. Grants have been awarded to 10 National Diffusion Network (NDN) "Lighthouse Projects" which use computers to enhance programs in occupational education in high technology and in basic skill instruction for compensatory education, as well as for teaching mathematics in grades 9 through 12, comprehensive secondary level reading for grades 7 through 12, and reading, mathematics, writing, and computer science for the learning disabled. (DJR)

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Our Future Growth Is Tied To Educational Technology

by
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Delivered at
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Southwest West Central
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Southwest State University
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Good Morning.

It is a pleasure to be here on the campus of Southwest State University on this cold, crisp and snowy morning. It is especially exciting to be part of a public forum here in Marhsall, Minnesota on "Interactive Telecommunications."

I do want to acknowledge the leadership of Dr. Robert Carothers, President of Southwest State University, Glen Shaw, Executive Director of the Southwest/West Central Educational Cooperative Service Unit, and Penny Dickhudt of the staff of the Minnesota Tele-Media Board and others who worked so hard to put together this public forum today. It is also a pleasure to see the Governor's Office is represented by a member of the Governor's Science and Technology Staff, Ms. Cindy Crist.

Your hard work is especially evident by the sponsorship of this. conference by Representative Vin Weber, Southwest/West Central Educational Cooperative Service Unit, Southwest State University and Minnesota Tele-Media as well as its endorsement by Senators Dave Durenberger and Rudy Boschwitz, the American Association of School Administrators, the Minnesota Association of School Administrators and the Minnesota Federation of Teachers.

Let me mention, you are indeed fortunate to have one of the brightest and hardest working Congressman as your representative in Washington, D.C. Representative Vin Weber is one of those dynamic young representatives who has a great interest in education and he was one of the first Members of Congress to hold hearings in his district to get reaction to the report of the National Commission on Excellence in. Education. Our acquaintanceship goes back to the days when we both

worked on Capitol Hill and it is unfortunate that Congressional business kept him from being with us today. He has always been diligent to his duties as a U.S. Representative and he provides all of you with outstanding representation in our nation's capitol.

I am delighted to speak with you about a matter of vital concern to everyone--not just those of us present today but to everyone in our nation, indeed, the world. The matter to which I am referring is the advent of the new and exciting technologies which is now being referred to as the technological revolution.

The Random House College Dictionary defines a revolution as:

> ...a complete, pervasive, usually radical change in something, often one made relatively quickly.

And this does describe the situation as it pertains to the technological advances being made today. Changes are taking place and they are taking place rapidly. It is imperative that those who are associated with educating our youth prepare themselves to incorporate, in an appropriate manner, the new technologies into the educative process.

There are many aspects to this revolution and many dimensions to the way in which it will affect education as well as our society as a whole. One aspect which has caught the fancy of futurists, and one which should in fact be a vital concern of educators, is how the computer will affect the world of work--both in the near future as well as in the decades to come. Interactive communication will be playing a greater role in urban as well as rural areas.

There are many questions raised by this particular issue. For example:

- o How can the computer enhance a workers ability to perform various tasks? How can it improve upon existing jobs?
- o How and will it affect the existence of many jobs?
- o Will the workday pattern of 9 to 5 at an office still exist or will going to an office become passe as a network of cottage industries with everyone working out of his or her own home, communicating with colleagues and clients by machine?

I, of course, can not give you a definitive answer to any of these questions but I can share with you some of the developments and information which can offer a perspective on the subject.

The advent of high technology has already begun to affect the job market. It has been pointed out that one of the reasons that its impact is so dramatic as far as the workplace is concerned is that it affects a large number of occupations at once. Many times the development of a new technology might affect only one or a few related job areas. Today's high technology is affecting or will eventually affect almost every job area.

An analogy might be the advent of the automobile. Not everyone needs to be an automobile mechanic or know how to design automobiles but it is the rare individual in today's society who does not know how to drive an automobile. The invention of the automobile opened many areas of work. These included bridge engineers, design and manufacture of automobiles, design and repair of roadways, those connected with new industries such as fast food and motor inns, as well as many other jobs peripherally related to the auto. It also changed dramatically patterns

of work by improving the speed of transport. People were now able to get to an office some distance from their home and to return in the same day.

So, while we don't all have jobs that are directly related to the automobile, it is more than likely that what we do is at least indirectly affected by the invention of what was less than a century ago an unheard of means of transportation.

Experts differ on how much the new technologies will affect the job market--some even say very little--but educators would be remiss to ignore this growing area.

In the area of high technology employment, predictions from the Bureau of Labor Statistics show high levels of growth during the 1980s for data processing mechanics, computer operators, and computer analysts with their respective levels of growth in employment being 92.3%, 71.6%, and 67.8%.

Not all jobs directly involving high technology necessarily involve a college education but almost all involve specialized training, and most likely, at some point, re-training.

And, additional training will become necessary for some occupations. For example, Gene Maeroff points out in the September 4 issue of the New York Times that:

> ...The use of computers may make them matter more as health technicians, for example, use more sophisticated diagnostic tools that have more complex instructions and yield more detailed data. For most young people then, movement up the career ladder will mean taking continuing education programs.

The new technologies can vastly improve a workers ability to perform a job. For example, take the job of a farmer operating a farm. The farmer to many people would seem far removed from the world of high-tech. And yet, he is not. The computer can provide many time-saving services for the farmer. It can assist him in record-keeping. It can provide information which will tell him the optimum time of the year for planting each crop and in doing so it can take into account variables such as weather conditions which could ultimately improve the harvest or even save a crop. Computers can talk to other computers so that an isolated farmer could be provided with a valuable means of communication.

Along those lines, and with far-reaching significance for not only the farmer but for almost everyone, is the introduction by a commercial firm of the Electronic University. An educational telecommunications system that requires no computer experience to use, it connects personal computers of students with personal computers of teachers. It can be used by anyone, anywhere in the world, to communicate with another person anywhere in the world. It has no geographical barriers. The technology which has made this possible is significant because it has eliminated the barrier of getting two computers together for communication.

The student and instructor will be able to communicate back and forth, in person, on the computer. Messages can be left through electronic mail.

It removes tremendous barriers to education. A handicapped person can learn or teach from his or her own home. People in remote areas will be able to take or offer classes.

The announcement launching the Computer University took place on September 12 of this year. Initially, 170 courses are being offered with many more in the developmental stage.

U.S. Secretary of Education, Terrel Bell, praised the electronic university for its potential to reach "all learners on all levels." This concept can open the doors of learning to virtually everyone.

It is also an exciting prospect as a means of retraining workers. Training for a career, until now, usually lasted a lifetime. It is likely that a person starting a career today may need as many as 3 or 4 re-trainings during their productive years.

The displaced worker is becoming a problem and could perhaps become an even greater problem in the future. It is a problem for which President Reagan has shown great concern. The Job Training Partnership Act, which began full operation on October 1, is an example of the type of program that could be of assistance in dealing with the problem of those who need additional job training or job re-training.

We can not say precisely at this time how the job market is going to change but we know that it will be changing. The Job Training Partnership Act is one of the types of steps that can be taken to deal with the problem of displaced workers that such changes are likely to bring about. This Act should be helpful to those who are facing troubles brought about by a changing job market.

The Job Training Partnership Act focuses on assisting people to obtain the skills needed in order to obtain a job. The emphasis is on helping them to get a job so that they can be less dependent on the government.

If large numbers of people are going to need job training or re-training to obtain a job it could create great demands and strain on government, if, instead of obtaining these skills, these individuals become dependent on the government for support. It is a problem that concerns all levels of government--federal, state, and local--and the this new law is designed to encourage all levels of government to work with the private sector on a problem that concerns them all.

Following the philosophy of President Reagan the program uses a block grant approach. Most of the control of the program is in the hands of local rather than federal officials.

Money allocated for the JTPA is money which is to be spent for training, unlike its predecessor, CETA, which emphasized paying wages rather than training for employment. There is no public sector job funding under the Act which stresses instead partnership with the private sector.

The programs for training participants will last from six to twelve months depending on the area of training for the participant. There will be an emphasis on skills training in high technology areas as well as other critical areas. Business and industry are full-partners in the program which cuts down on government cost.

Because of the block grant approach implementation will vary according to the approach of the local decision-makers.

The new technologies are important to educators. They will affect not only what we teach but how we teach it. More and more educators are beginning of recognize the great potential of technology to enhance learning of students, increase teacher productivity, and produce more effective schools.

The recently released report by the National Commission on Excellence in Education, A Nation at Risk: The Imperative for Educational Reform, has done much to focus national attention on education.

The Commission was appointed by U.S. Secretary of Education, Terrel H. Bell. The job of the Commission was to review and report on the status of education throughout the United States.

The report which resulted has alarmed many educators. It presented documented evidence that shows many aspects of our educational system to be in serious trouble. We can not afford to be complacent about our schools; we can not accept the status quo.

Allow me to quote from the report:

> Our nation is at risk. Our once unchallenged preeminance in commerce, industry, science and technological innovation is being overtaken by competitors throughout the world....the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people. What was unimaginable a generation ago has begun to occur--others are matching and surpassing our educational attainments...We have, in effect, been committing an act of unthinking, unilateral educational disarmament.

The findings of the Commission were hardly a surprise to educators who have perceived these trends over the past few years. The same alarming trends were confirmed by other reports which were issued subsequently: The Action for Excellence report of the Task Force on Education for Economic Growth by the Education Commission of the States, the Report of the Twentieth Century Fund Task Force on Federal Elementary and Secondary Education Policy, and America's Competitive Challenge: The Need for a National Response, of the Business-Higher Education Forum.

These reports issue a clarion call to all of us to assess where we have been in education where we are presently, and where we should be going. It is important to realize that money alone will not resolve our problems in education. We are already spending a total of $230 billion per year on education--public and private. An excessive infusion of money could result in more problems if it is used to make the same mistakes but with more resources.

Obviously, some things are right with American education and some things need improving. The report by the National Commission on Excellence in Education provides an impetus for not only those who have careers in education but the public at large to focus on improving education.

There has been a lot of interest generated by the report and the recommendations of the Commission. If it has done nothing else, it has created a renewed interest in education and brought it to the forefront of issues facing us today.

This is very positive for education. Given time, I believe the interest will generate some very beneficial results in the education of our young people.

One recommendation of the Commission which is pertinent to our discussion here today is related to State and local high school graduation requirements. The Commission is calling for the strengthening of these requirements and states:

> ...at a minimum, all students seeking a diploma be required to lay the foundations in the Five New Basics by taking the following curriculum during their 4 years of high school: (a) 4 years of English; (b) 3 years of mathematics; (c) 3 years of science; (d) 3 years of social studies; and (e) one-half year of computer science. For the college-bound, 2 years of foreign language in high school are strongly recommended in addition to those taken earlier.

I believe it is especially significant that a recommendation is made for computer science. Computers are beginning to have a vital role in the educational arena; it is inevitable that that role will continue to grow at an ever increasing rate. It is significant to note that the Commission feels that it is already important enough for every student receiving a high school diploma to have at least one half year of computer science. Even those of us who have championed the liberal arts recognize that there is such a thing as a "new liberal arts". The concept of a liberal education has focused on education as serving the inner being of the individual and the spirit of society rather than just material needs; it caters to the human urge to understand the world in which the individual finds himself rather than give in to an animal need to exert some control over the world. Stephen White, Director of

Special Projects for the Alfred P. Sloan Foundation, notes that the computer is beginning to do for the mind of man what the engine did for the muscle of man:

> The engine permitted man to manipulate matter in great bulk and at great speed; the computer permits man to manipulate data with the same extraordinary facility.

Thus the "new liberal arts" require a knowledge of "technology" and "analytical skills". For the teacher in any field, as well as the poet, the artist and the philosopher, live in a world in which they must deal with data during the dawning of an "information society". And such innovative institutions as Carnegie-Mellon University expect that almost every one of their students by 1986 will be working on a computer not just in math and engineering but in drama, music, history and writing. We all know that the technology revolution is not the future; it is here now.

Instructional technology offers us a great opportunity to improve education. We must not treat it as a fad or game but as a tool tied to quality and excellence in education.

During a National Teleconference on Educational Technology held on June 22, 1982, in Washington, D. C. Secretary bell announced that technology would be one of his lead initiatives in education. There were over forty-five state sites, including the one in D.C., that participated in two days of activities highlighting technology in education.

The Office of Educational Research and Improvement was selected by the Secretary to take the lead in implementing his initiative on technology. OERI has become involved with a number of interesting and exciting educational programs.

Our Center for Libraries and Educational Improvement is monitoring several contracts which utilize technology to improve the teaching of the basic skills. One of these is a communication program known as Project Quill. It uses a set of microcomputer-based programs around which several instructional activities have been developed. The activities are geared to young writers in grades 3 to 6. Quill utilizes the microcomputer's technological capabilities to help teachers teach writing. The youngster's natural enthusiasm for anything connected with the computer strongly motivates them to write and to perform the various tasks which are a part of the program. It has helped to eliminate the drudgery of rewriting compositions by hand. Corrections and rewrites can be made quickly on the word processor and a print-out secured. In addition we are also supporting studies focusing on the use of computers to teach math and science.

We are also using technology, educational television, to teach science through such programs as the "Voyage of the Mimi" and, in cooperation with the National Science Foundation, "3-2-1 Contact".

Our National Center for Education Statistics has completed surveys showing the growing use of computers in the schools.

The National Diffusion Network, also under OERI, identifies exemplary programs and assists schools to implement them. Under Secretary Bell's leadership, the NDN initiated "Lighthouse Projects".

As a result of the current emphasis on technology, the National Diffusion Network has awarded grants to ten "Lighthouse Projects" in Technology. The Lighthouse Projects are designated as such because they are using technology to enhance education in an outstanding way. The federal grants will enable those schools to host visitors from all over the country and to provide material on their adaptations of technology to school use.

The programs are:

- o Project C.O.F.F.E.E. or the Cooperative Federation for Educational Experiences located in Oxford, Massachusetts. It offers a regional alternative occupational education program in high technology to secondary school age youth, some of whom were previously school dropouts. C.O.F.F.E.E. is noteworthy for the exemplary school/business partnership which it has formed with the Digital Equipment Corporation of Bedford, Massachusetts and for which it received a Presidential Commendation. Digital has been extremely supportive of school efforts to learn about and use computers.
- o The Merrimack Education Center in Chelmsford, Massachusetts. It is a computer assisted instruction program developed to assist in the improvement of basic skills instruction for compensatory education populations. The program staff includes professional educators who are available to provide technical assistance in introducing successful computer applications to the schools. The

Project consists of four main components: (1) Computer Assisted Instruction, (2) School System Computer Support, (3) Computer Training and (4) Computer Software Exchange Library.

- o In Asbury Park, New Jersey, the Board of Education offers a course which utilizes computer assisted instruction for secondary mathematics courses in grades 9-12. Educational software designed for the purpose of integrating computer-assisted instruction with traditional techniques utilized in teaching Algebra I, Algebra II, Geometry, Trigonometry, Calculus, and Applied Mathematics has been developed and field tested for purposes of the program.
- o The Evaluation Center, located here in Minnesota in the Hopkins Public Schools, Hopkins, Minnesota is involved in the implementation and utilization of data processing systems in the administrative, management, and instructional functions of schools. Most recently, it is concentrating on the utilization of microcomputers.
- o Project READ:S or the Reading Education Accountability Design: Secondary (Idaho) is a comprehensive secondary level reading program (grades 7 to 12) with a computer assisted component. It utilizes motivations and technological advantages of the microcomputer in the direct instruction, reinforcement, inservice training of teachers, and the management processes which are integral to the reading program itself.

- o Project CUE or Computer Utilization in Education (New York) is a criterion-referenced reading and mathematics curriculum offered in a laboratory setting which utilizes computer assisted instructional applications as the primary instructional methodology by which remedial services are provided.
- o MATH/TECH (California) is a mathematics project which systematically integrates the microcomputer into the 7th-12th grade classroom utilizing an easy-to-use curriculum which supplements and parallels the traditional 7th-12th grade mathematics curriculum.
- o RECIPE or Research Exchange for Computerized Individualized Program for Education (Florida) is a program for learning disabled children in grades K-6. It is an objective based instructional and computer management system that assists these students in mastering specific objectives in the basic skills areas of reading, mathematics, and writing.
- o Project CAISH or Computer Assisted Instruction and Support for the Handicapped (Arkansas) is targeted at ninth grade students. It is an approach which attempts to provide a basic level of literacy and competency in computer science through hands-on experience, as well as providing students who have the aptitude and interest the opportunity to develop higher level skills in computer science and programming.

o Project HOSTS, Helping One Student to Succeed, of Vancouver, Washington, which covers computer-assisted instruction and literacy programs (electronics, physics, chemistry, math, music, word processing, gifted program, summer computer camps, and telecommunications).

In order to better focus on the potential of the computer, the Office of Educational Research and Improvement in November of 1982 convened a Research Conference in Pittsburgh, Pennsylvania. The conference participants were asked to examine the future of computers in education as well as examining what research is needed in order to realize the potential of the computer.

A number of education related occupations were represented among the forty experts invited to participate. These included: scientists, psychologists, educational researchers, teachers, and school administrators. A two volume work entitled Computers in Education: Realizing the Potential resulted from that conference. In the Chairmen's report, computers are acknowledged as "tools of education"--- for both students and teachers. The report states:

> ...Computers can be powerful intellectual tools. They can perform arithmetic calculations and are becoming able to manipulate equations; they can facilitate the writing process and expedite formatting and revision; they can retrieve information from large data bases. These capabilities can be used to shift educational emphasis from the teaching of routine skills to the teaching of the more sophisticated thinking skills needed in our technological society. They can also be used to improve learning in non-technology areas.

There has been growing concern recently throughout the nation, about the poor showing of students in the basics. Standardized scores verify that colleges and employers concerns regarding students poor performance in reading, writing, mathematics, and science is indeed a fact. Performance in these areas has been on the decline for the past two decades. With proper application there is no reason why computers can not serve as a tool to improve teaching and learning in these very important areas. Interest is being focused on the Hempstead model. The Hempstead School district in New York state, serving largely a disadvantaged student group, has demonstrated that microcomputer aided preparation can be an effective and relatively inexpensive way of helping students raise their SAT scores.

We have an obligation to educate American students to the best of their academic ability. President Reagan has noted that while the role of the federal government is limited in the area of education, nevertheless, there is much the federal government can do to

> help set a national agenda for excellence in education, a commitment to quality that can open new opportunities and new horizons for young people.

We must educate a generation of Americans with the understanding and skills to fully participate in the technological world in which they must function.

We Americans have a bright and optimistic future, and we cheat our youth if we paint a picture of the future which is grim and despairing.

We have had too much emphasis on the negatives--energy resources drying up, pollution of the environment, and burdens of the "have not" nations supposedly imposed by the "have" nations. Dr. Herman Kahn, who died suddenly earlier this year, noted that even more significant that what our children are being taught is what they are not being taught. The lessons unlearned in our classrooms are that the wealthy nations play a constructive and essential role in furthering world economics, that rapid economic growth has changed many non-Western nations from poor to middle-income status, and that most resources are more accessible and less costly today than ever before. In addition, he noted that all these forms of progress are likely to proceed even more effectively in the future.

In his last great work, The Coming Boom, Dr. Kahn reminded us that high technology promises to bring back

> a sense of excitement, achievement, and progress which even astronauts and outer space no longer elicit.

I commend you in Minnesota for the excellent work you are doing. As you can see, many exciting programs are already in place. These are exciting times for educators. This 18 county interactive telecommunications is such a program. As pioneers for education we are in a position to open new frontiers as we chart a course for the future. We can, and I am sure will, improve and adapt education in America to meet the needs of today's student, tomorrow's citizen.